

# **REMARKS FOR ADMINISTRATOR BOLDEN**

## **GODDARD MEMORIAL SYMPOSIUM**

**March 11, 2015**

Thank you, Christyl (Johnson),

It's a wonderful time to be in aerospace. Just this week alone we launch a cutting edge science mission, mark milestones in the Space Launch System and welcome astronauts home from the International Space Station.

We're witnessing a renaissance in many fields and an expansion of many that are still in their infancy, such as the discovery of planets outside our solar system.

It was just a few short years ago that President Obama visited the Kennedy Space Center in Florida and committed us to a Journey to Mars.

The President challenged us to visit an asteroid by 2025 and put humans in the Martian environment in the 2030's. We'll begin with an unprecedented mission to redirect an asteroid into orbit in cis lunar space and send astronauts to it as part of a stepping stone approach to reach the Red Planet.

Thanks to the hard work of our NASA team – and the work of our contractor, academic and entrepreneurial partners all across America -- we've made a lot of progress on that journey.

Today, the largest, most powerful booster ever built for our new Space Launch System, or SLS, which will carry astronauts to deep space aboard *Orion*, will fire up for a ground test at Orbital ATK Propulsion Systems' test facilities in Promontory, Utah.

At our Stennis Space Center in Mississippi, we recently tested the RS-25 engines from the space shuttle, four of which will power the SLS. This vehicle has moved from formulation to development, something no other exploration class vehicle has achieved since the agency built the Space Shuttle.

I think most of you are aware of how great the *Orion* spacecraft performed on its first flight test this past December.

Our latest cutting edge science mission, developed right near here at the Goddard Space Flight Center launches tomorrow! The Magnetospheric Multiscale (MMS) mission will study magnetic reconnection, a fundamental process that occurs throughout the universe when magnetic fields connect and disconnect explosively, releasing energy and accelerating particles up to nearly the speed of light.

Thanks to grit, determination and American ingenuity, we've returned cargo resupply missions to the International Space Station (ISS) to the United States, insourcing these jobs and creating a whole new private market in low Earth orbit.

Now SpaceX and The Boeing Company are developing the new systems in which our astronauts soon will travel once again from American soil to the Station. This work is an incredible testament to American ingenuity and know-how and an extraordinary validation of the vision we laid out just a few years ago as we prepared for the long planned retirement of the Space Shuttle.

Just a couple of weeks ago, astronauts aboard the Space Station undertook three successful spacewalks to help configure the station to accept these commercial vehicles in the 2017 timeframe.

Last month, Boeing and United Launch Alliance broke ground on the crew access tower at Cape Canaveral Air Force Base in Florida. This means the structure that astronauts will use to access Boeing's space transportation system is now in progress. Soon, SpaceX will test the launch abort system that will carry astronauts to safety in the event of an emergency at launch.

On Thursday, Bigelow Aerospace marks the completion of all major milestones on the Bigelow Expandable Activity Module (*BEAM*) – an inflatable habitat experiment -- which will launch to ISS later this year and be installed on the aft port of the station's Tranquility node.

These are just a few examples of our progress and the innovation of our partners.

NASA is fortunate to benefit from wide and deep bipartisan support in the Congress. I think if you look around this room you'll find people with many different points of view, but we can all agree that our nation's space program is vital, not only for technological competitiveness, but for the economy, and to inspire future generations.

President Obama has proposed an FY2016 budget of \$18.5 billion dollars for NASA, building on the significant investments the Administration has made in America's space program over the past six years. That's a half billion-dollar increase over last year's enacted budget, and it is a clear vote of confidence in our ambitious exploration program.

As I have said frequently, NASA is firmly on a Journey to Mars and make no mistake, this journey will help guide and define our generation.

This year we celebrate 50 years since Edward White left his Gemini capsule to become America's first spacewalker. It was only a few years later that we landed humans on the moon, and not too long after that the United States became the first, and still only nation, to successfully land a spacecraft on Mars.

Our incredible 30-year Space Shuttle Era followed from 1981 through July 2011, during which the science community saw the deployment of three of the four Great Observatories deployed from the shuttle during the decade of the '90's – the *Hubble Space Telescope* (Apr '90), the *Compton Gamma Ray Observatory* (Apr '91) and the *Chandra X-Ray Observatory* (Jul '99) – contributing to a golden age of planetary and astrophysics exploration and discovery.

It was through the Space Shuttle Program that NASA opened space flight to many who had previously had no chance of flying – bringing diversity in our crews to include women, minorities and astronauts from many of our partner nations – perhaps its greatest legacy.

Over the past six years, we've taken the most concrete steps *ever* to advance a human mission to Mars. Astronauts on the Station, for instance, perform countless experiments helping us learn about human health in space and demonstrating the technologies to go farther.

Later this month, we launch astronaut Scott Kelly and his Russian counterpart, Mikhail Kornienko, on a one-year mission aboard the Station to learn more about how to live and work in space for the long term, comparing Scott's vital signs to those of his twin brother, Mark, here on Earth.



This will be the first ever experiment using identical twins to learn more about the effects of living in space.

But this journey to Mars, indeed our entire path to the future, starts now, right here on Earth. Our commercial crew work, for example, encompasses efforts in 37 states from Nevada to Montana to Kansas, Wisconsin and New Jersey, and of course, Maryland, D.C. and Virginia.

We know that technology drives exploration and our journey to Mars. So, we will continue to develop advanced solar electric propulsion systems needed for the Asteroid Redirect Mission (ARM) and other deep space missions and to make advances in the atomic clocks and green propellants that will guide and power our future missions.

This summer, we plan to once again test the Low Density Supersonic Decelerator off the coast of Kauai.

The data we gain is critical to proving in flight the new technologies critical for landing larger payloads on the surface of the Red Planet.

As we advance our journey to Mars, we're also focusing here on Earth on making aviation greener, quieter, and more efficient. It's been 100 years since NASA's predecessor; the National Advisory Committee for Aeronautics was formed.

Today, every U.S. aircraft and U.S. air traffic control tower has NASA-developed-technology on board. NASA scientists and engineers are working on new composite materials that will make future air and spacecraft lighter and more durable. NASA is with you when you fly and we're committed to transforming aviation by dramatically reducing its environmental impact, maintaining safety in more crowded skies, and paving the way toward revolutionary aircraft shapes and propulsion systems.

You all know, especially those of you who work at Goddard, how incredible our Science portfolio is.

In the last twelve months, we've launched five Earth science missions – five! The last in these “Year of Earth” missions, Soil Moisture Active Passive, or *SMAP*, was launched in January.

Global Precipitation Measurement has now been in space for a year, thanks to hard work at Goddard. *CATS*, the Cloud Aerosol Transport System, is aboard the Station, so Goddard's work there is helping advance the station's use as an Earth science platform. These missions are studying such diverse aspects of our planet as ocean winds, components of our atmosphere and precipitation on a global level.

As we strive to achieve the dream of sending humans to Mars, it's important to remember we're already there.

For 40 years, increasingly advanced robotic explorers have studied the Red Planet. This has dramatically increased our scientific knowledge and helped pave the way for astronauts to travel there. Our latest Mars spacecraft, *MAVEN*, arrived last September to study the upper atmosphere and joined a fleet of orbiters and rovers on the surface. Next year, we will send the *InSight* lander to study the planet's core. In 2020 a new rover building on the incredible success of *Curiosity* will help us prepare for human arrival at Mars and, for the first time ever, will cache a sample for later return to Earth.

Mars is a key destination, but it's only one point on our journey of discovery.

I was privileged 25 years ago next month to pilot the Space Shuttle Discovery's STS-31 mission, during which we deployed the Hubble Space Telescope. *Hubble* is still doing amazing science.

In just three years, we'll launch the James Webb Space Telescope, *Hubble's* successor, which is taking shape right now not far from here at Goddard.

After nearly nine years and three billion miles of travel, the *New Horizons* spacecraft was awakened in January to prepare for its arrival in the Pluto system in July. The *Dawn* spacecraft has just begun to orbit Ceres and became the first mission to orbit a dwarf planet. *Juno* is speeding toward arrival at Jupiter next year, where it will not only send back unprecedented data from a first ever polar orbit of our giant neighbor, it will demonstrate how solar power can work at great distances from the sun.

Looking to the future, we're planning a mission to explore Jupiter's fascinating moon Europa, selecting instruments this spring and moving toward the next phase of our work.

The Kepler mission continues to discover new planets outside our solar system. It has confirmed more than 1000 planets, some of which could be rocky like Earth. The Solar Dynamics Observatory – managed at Goddard -- just took its 100 MILLIONTH image of the sun.

In dozens of other Astrophysics and Heliophysics missions, the data streaming back to us is bathing us in information through which scientists will sort, decipher and make discoveries for years to come.

But with all of this, still our journey of discovery has only just begun. Together, humans and robots will pioneer Mars and the solar system.

In fact, they already work closely together aboard the Space Station. As the President said in his State of the Union speech recently, “[we’re] ...pushing out into the solar system not just to visit, but to stay.” We’re making our mark on history, and along the way we’re inspiring a whole new generation of scientists, engineers and astronauts. That’s why we’re dedicated to education in science, technology, engineering and mathematics, or STEM, and broadening the pipeline to develop the leaders of the future. That’s why we’ve been inviting citizen scientists, makers and innovators from across America to share their best ideas through prizes and challenges.

So I want to assure all of you who by your very presence here have demonstrated your passion for exploration that America’s space program is not just alive, it is thriving!

Together with our commercial and international partners, academia and entrepreneurs, we're launching the future. With the continued support of the Administration, the Congress and the American people, we'll all get there together and we'll continue to make the impossible possible and turn science fiction into science fact.

Thank you.